VEP8A Satellite Emergency Position Indicating Radio Beacon (EPIRB)

User Manual

VEP8A Satellite Emergency Position Indicating

Radio Beacon (EPIRB) User Manual

Checklist

Confirm that the beacon you received includes all of the following:

Name	Quantity	Description
Beacon	1	With lanyard
Release Unit	1	With Hydrostatic Release Unit (HRU)
Bolts	4	For installation
User Manual	1	Includes installation, use, maintenance, etc.
HRU Product Quality Certificate	1	China Classification Society (CCS) Authorization Certificate
Factory Test Report	1	Factory test data
Marine Product Inspection Certificate	1	China Classification Society or China Fishery Inspection, etc.
Warranty Card	1	Warranty information

If any items are missing or damaged, please contact our company or an authorized dealer immediately.

CONTENTS

1 OVERVIEW

The COSPAS-SARSAT system is a satellite system that assists search and rescue operations by providing alert and location data. It detects the 406MHz signals from beacons through space and ground segments to locate the coordinates of the incident site. The incident location and other relevant information are sent to appropriate domestic search and rescue organizations via the relevant COSPAS-SARSAT Mission Control Centers. Its goal is to assist all responsible organizations worldwide in conducting search and rescue operations, whether at sea, in the air, or on land.

The VEP8A Satellite Emergency Position Indicating Radio Beacon (EPIRB) operates based on the COSPAS-SARSAT system and is applied by the International Maritime Organization (IMO) in the Global Maritime Distress and Safety System (GMDSS). Figure 1 illustrates how a distress signal based on independent identification operates within the global distress alerting system.

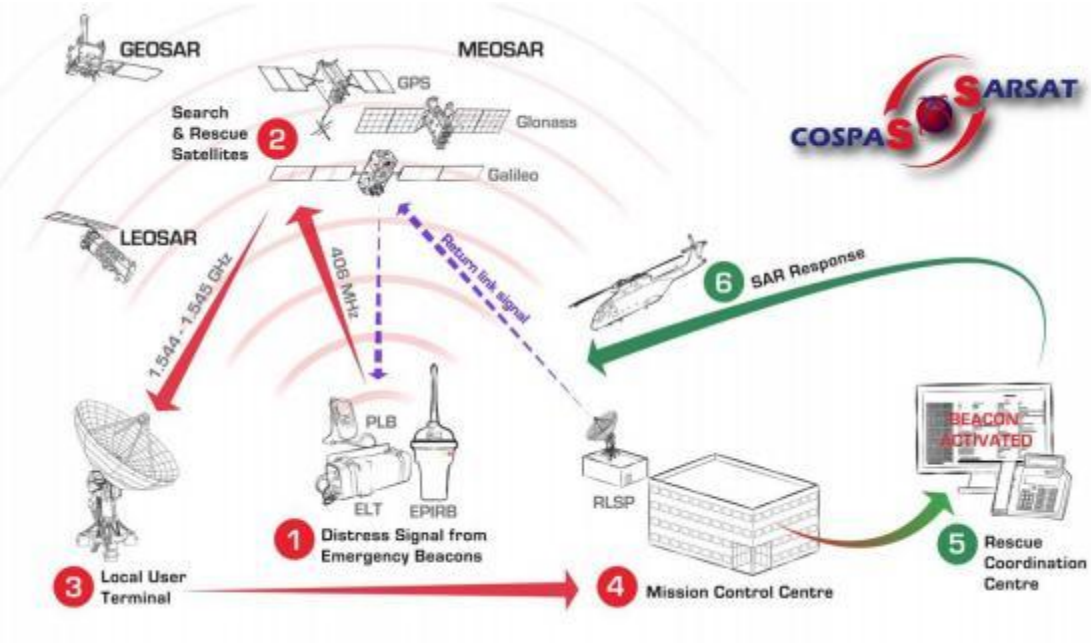


Figure 1: Global Distress Alerting System

COSPAS-SARSAT System Composition:

- 6 Low-altitude Low Earth Orbit Satellites (LEOSAR)
- 9 Geostationary Orbit Satellites (GEOSAR), over 40 Medium Earth Orbit Satellites (MEOSAR)
- Local User Terminals (LUTs)
- Mission Control Centers / Rescue Coordination Centers (MCC/RCC)

- Beacons (EPIRB, ELT, PLB)

Signal Processing Procedure from EPIRB:

- Activate the EPIRB;
- The EPIRB transmits a 0.52s long signal carrying the vessel identification code or serial number, approximately every 50s;
- The satellite receiving the signal from the EPIRB retransmits the signal to available LUTs within the satellite's field of view;
- The LUT processes the received signal to obtain the EPIRB's location information and transmits this information to the MCC. After confirming by phone that it is not a false alarm, the RCC initiates rescue;
- The EPIRB also transmits an AIS positioning signal. This alert signal's location information, upon being received by nearby vessels, can initiate mutual rescue;
- The EPIRB also transmits a 121.5MHz homing signal. This alert signal can be received by nearby search and rescue organizations (SAR) or aircraft, allowing rough positioning of the EPIRB.

2 PRODUCT DESCRIPTION

The VEP8A is a Free-Float Satellite Emergency Position Indicating Radio Beacon (FF S.EPIRB) that transmits 406MHz distress signals, AIS positioning signals, and 121.5MHz homing signals. It complies with relevant IMO/CCIR and COSPAS-SARSAT regulations. It is essential equipment for distress search and rescue.

When a vessel is in distress and sinks, the VEP8A automatically releases from the release unit and transmits a 406MHz emergency distress signal. After the signal is received by the COSPAS-SARSAT system satellites, it is relayed to shore-based terminals. The LUT (Local User Terminal) decodes and analyzes the beacon's position and relays it to the RCC (Rescue Coordination Center) for emergency rescue operations.

The VEP8A sends distress signals via satellite to a global rescue system. This distress signal can be received anywhere, quickly identified, and located with an accuracy within 2 nautical miles.

The VEP8A meets COSPAS-SARSAT EPIRB requirements and includes the following 3 transmitters:

1. 406MHz frequency: For positioning and identification signals via COSPAS-SARSAT satellites.

2. AIS positioning signal: Broadcasts target position signal, which can be promptly received by AIS terminals on nearby vessels.

3. 121.5MHz aviation distress frequency: Assists search and rescue through homing.

The VEP8A can be used on vessels of any size and offers the following advantages:

- Built-in GNSS for shorter positioning time and higher positioning accuracy.
- Simple installation and storage (optimized design).
- Simple and safe operation.
- Manual transmission through simple operation.
- Easy handling in emergencies (ergonomic design).

- Multi-level switch protection system to prevent misuse (water activation switch, magnetic switch).
- Free-release mechanism, releases at depths between 2 to 4 meters and rises to the surface.
- Bright orange housing, watertight above 1 bar.
- Manual switch for self-test.
- High-brightness omnidirectional white strobe light and infrared night vision strobe light.
- Battery life 5 years, continuous operation >48 hours.

3 PRODUCT SPECIFICATIONS

General

Operating Temperature Range	-20°C to +55°C
Storage Temperature Range	-40°C to +65°C
Battery	Lithium Thionyl Chloride ($Li/SOCl_2$), validity period 5 years
Operating Time	>48h @ -20°C
Waterproof	1 bar
Dimensions	Φ140 / H231.5mm (excluding antenna)
Weight	< 1.7 kg
Strobe Light	24 times per minute (brightness >1cd)

406MHz Satellite Signal Transmitter

Transmit Frequency	406.040MHz ± 1kHz
Output Power	5W (37dBm) ± 2dB
Phase Modulation	1.1rad ± 0.1rad
Repetition Period	47.5s ~52.5s
Transmission Duration	Long message: 520ms ± 1% (Short message: 440ms ± 1%)
Encoding	Bi-Phase L Encoding

121.5MHz Homing Transmitter

Transmit Frequency	121.5MHz ± 50ppm
Output Power	17dBm ± 3dB
Modulation	A3X
Modulation Duty Cycle	33 % ~ 55 %

Transmission Duty Cycle	55% (1.28s ON, 0.96s OFF)

AIS Positioning Transmitter

Transmit Frequencies	161.975MHz, 162.025MHz
Output Power	1W (30dBm) ± 2dB
Modulation	GMSK, FM, 9600bps
Transmission Duration	≤26.6ms

GNSS Global Navigation Satellite System

Receiver	50 channels, L1 frequency, C/A code
Positioning Accuracy	<100m
Receive Antenna	Ceramic patch

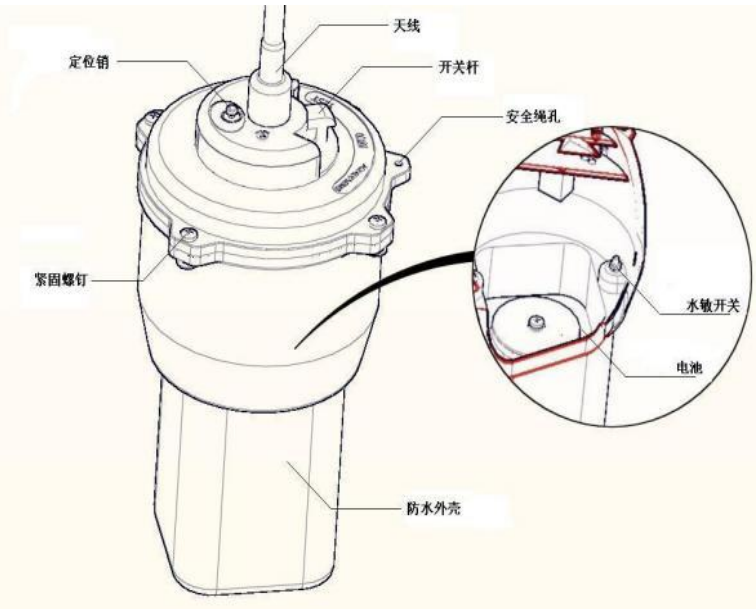


Figure 2: VEP8A Structure Diagram

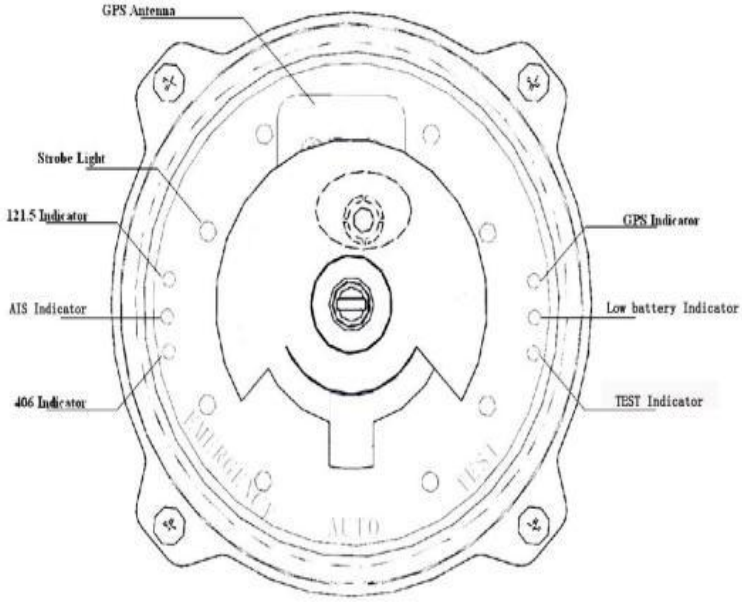


Figure 3: VEP8A Top View

4 OPERATION INSTRUCTIONS

4.1 Site Selection

The VEP8A generally floats on the sea surface. However, if other situations are encountered, refer to the following guidance to ensure optimal VEP8A performance.

On a vessel:

Place the VEP8A in an open area with no protruding obstructions; keep the VEP8A upright (if necessary, hold it tightly and raise it); activate the VEP8A.

Prohibited:

- Placing the VEP8A near large structures;
- Laying the VEP8A flat;
- Placing the VEP8A in concealed locations.

Warning:

The GNSS receiver may be interfered with by GMDSS-approved satellite communication systems within a 10m distance. The ability to obtain a position on the ship's deck may be degraded. Keep as far away as possible during use.

On a lifeboat:

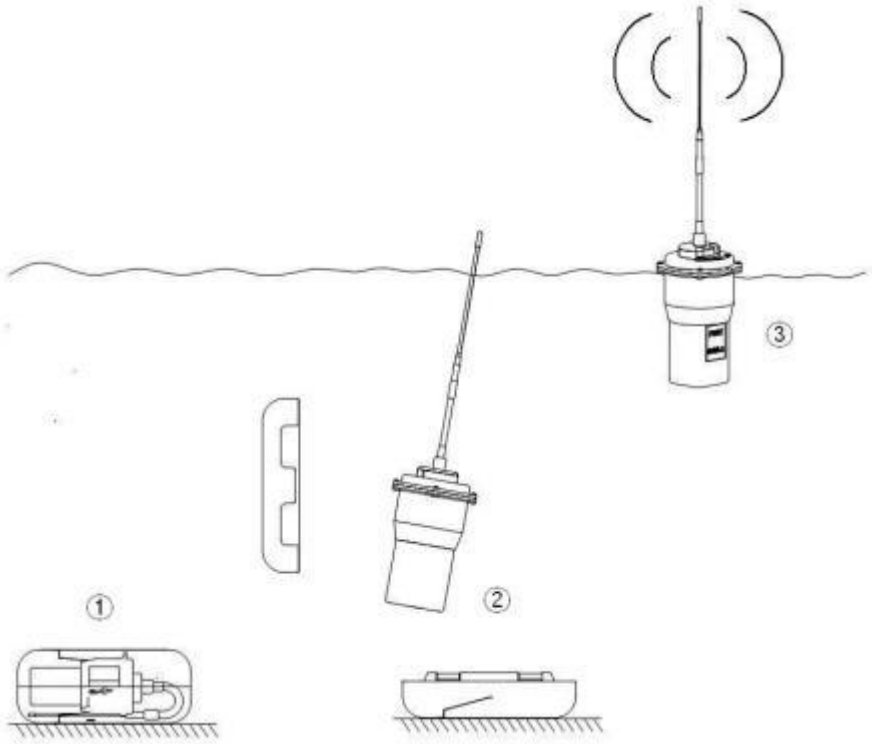
Hold the VEP8A as high as possible, avoid working under a canopy.

Note: Prolonged direct viewing of the high-brightness strobe light may cause discomfort.

Note: Placing it in water provides better transmission performance.

4.2 Automatic Operation Mode

The VEP8A is of the free-float type. Once the vessel sinks in distress, and the VEP8A sinks with the ship, before reaching a depth of 4 meters, the VEP8A will automatically release from the release unit, float to the surface, the water-activated switch conducts upon contact with water, the VEP8A indicator light flashes, and it automatically begins transmitting distress signals.



For personnel on a lifeboat, to be rescued in the shortest possible time, remove the VEP8A from the release unit, tie the lanyard on the VEP8A to the life raft, then throw the VEP8A into the water. The water-activated switch conducts upon contact with water, and the VEP8A indicator light will flash and begin automatic operation.

Do not use the satellite EPIRB inside the life raft or under any similar cover or canopy.

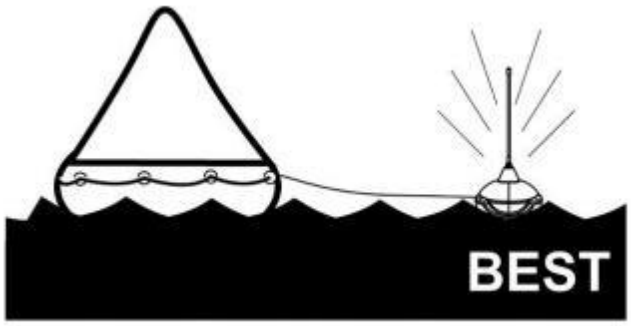


Figure 4: Optimal Usage Method on Lifeboat

When the VEP8A is in emergency operation mode, the meanings represented by various indicator lights are shown in Table 2.

The lanyard extends approximately 6m. After activation, the end of the rope can be tied to the life raft, and the beacon can be thrown into the water for operation. This avoids discomfort to the eyes from the beacon's strobe light and reduces signal blockage by the human body or life raft, improving alert reliability.

Table 2: Indicator Status Meanings in Emergency Operation Mode

EPIRB Status	**LED TX121**	**LED AIS**	**LED TX406**	**LED GNSS**	**LED BATT**	**LED ○T**	**Strobe Light**
Emergency Operation	Flash	Flash	Flash	OFF	X	X	Flash
GNSS Positioning	X	X	X	Flash	X	X	Flash
After GNSS Fix Success	X	X	X	ON	X	X	Flash
After GNSS Report	X	X	X	ON→OFF	X	X	Flash
Low Battery	X	X	X	X	Flash	X	Flash
406MHz Transmitting	X	X	Flash	X	X	X	Flash
AIS Transmitting	X	Flash	X	X	X	X	Flash
121.5MHz Transmitting	Flash	X	X	X	X	X	Flash
PLL Malfunction	X	X	X	X	X	Flash 4 times	Flash
Temperature Sensor Malfunction	X	X	X	X	X	Flash 5 times	Flash

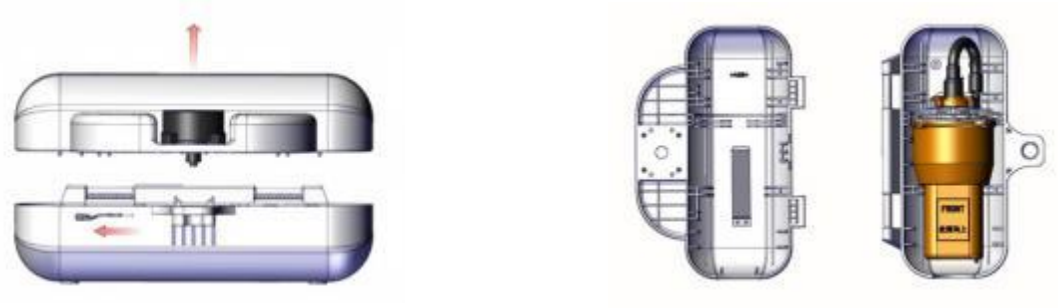
Note: "X" indicates the indicator status is determined by the operating mode, including steady on, off, or flashing.

4.3 Manual Operation Mode

Sometimes, when a vessel is in distress but has not sunk, manual operation to transmit a distress signal is required.

First, pull out the pin below the pressure release mechanism of the release unit, open the release unit, and remove the VEP8A. Carry the VEP8A to an open area;

Then, move the switch lever about 5mm to the right, and forcefully pull out the T-shaped pin. This action will tear the label. At this point, the switch lever will automatically spring to the "EMERGENCY" position. The VEP8A's self-test indicator light begins to flash, indicating the VEP8A is working. Specific steps can be seen in the figure below.



(a) *(b)*

(c) *(d)*

Figure 5: Manual Operation Method Diagram

Note: The built-in GNSS receiver on the VEP8A requires the widest possible view to receive signals from enough satellites to determine its position. If there are insufficient satellites, the VEP8A will continue to transmit the 406MHz distress signal, and the COSPAS-SARSAT satellites can determine its approximate coordinates using Doppler technology.

The lanyard extends approximately 6m. After activation, the end of the rope can be tied to the life raft, and the beacon can be thrown into the water for operation. This avoids discomfort to the eyes from the beacon's strobe light and reduces signal blockage by the human body or life raft, improving alert reliability.

Do not use the satellite EPIRB inside the life raft or under any similar cover or canopy.

4.4 Self-Test Mode

Note: Excessive self-testing can lead to premature battery discharge, resulting in the EPIRB not having sufficient power to operate;

Self-testing should be limited to the first 5 minutes of any hour.

- Remove the VEP8A from the release unit
- Manually push the switch lever to the "Self-test" position and hold it, refer to Figure 6
- The self-test process takes about 10 seconds. After completion, if the ○T indicator lights steadily and the strobe light flashes once, it indicates the self-test is normal
- If the ○T indicator flashes or remains off after 10 seconds, it indicates a self-test abnormality. The corresponding fault indicator light will illuminate. Refer to Table 3 for specific faults
- During self-test, the 406MHz signal is transmitted only once, the 121.5MHz transmits for 1 second, and AIS transmits 1 frame of data on each of its two frequency channels
- After the self-test, release the switch lever; it will automatically return to the "AUTO" position, automatically turning off the VEP8A

Figure 6: Beacon Self-test Method

When the VEP8A is in self-test mode, the meanings represented by various indicator lights are shown in the table below.

Table 3: Indicator Status Meanings in Self-Test Mode

EPIRB Status	LED TX121	LED AIS	LED TX406	LED GNSS	LED BATT	LED ○T	Strobe Light
Self-Test Normal	OFF	OFF	OFF	OFF	OFF	ON	Flash 1 time
Low Battery or Multiple Alarms Sent	X	X	X	X	ON	X	OFF
GNSS Communication Failure	X	X	X	ON	X	X	OFF
406MHz Low Power	X	X	ON	X	X	X	OFF
AIS Low Power	X	ON	X	X	X	X	OFF
121.5MHz Low Power	ON	X	X	X	X	X	OFF
Protocol Input Failure	X	X	X	X	X	Flash 2 times	OFF
Self-Test Count Exceeded	X	X	X	X	X	Flash 3 times	OFF
PLL Malfunction	X	X	X	X	X	Flash 4 times	OFF
Temperature Sensor Malfunction	X	X	X	X	X	Flash 5 times	OFF

Note: "X" indicates the indicator status is determined by the operating mode, including steady on, off, or flashing.

ON = Steady On, OFF = Off.

If the low battery indicator lights up, contact an authorized service provider for battery replacement.

4.5 Turning Off Transmission

In automatic transmission mode, take the VEP8A out of the water, dry it, and ensure the two water-sensitive contacts in the middle of the lower housing are dry. This will turn off the VEP8A.

In manual transmission mode, move the switch lever from "Standby" to "Distress" and reinsert the T-shaped pin. The indicator light will stop flashing, and the VEP8A will stop the alarm.

4.6 Preventing False Alarms

Modern beacons have water-activated switches, and it is not uncommon for seawater to activate the switch in rough sea conditions or heavy rain, often because the beacon was not properly placed in its release unit. To prevent false alarms from the beacon, there is a hidden magnet in the beacon release unit that keeps it in the off state. If the beacon is not correctly placed in the bracket and the release unit cover is not properly closed, the magnet cannot function normally, and seawater or rainwater may activate the beacon's water-sensitive switch. The dual-switch protection and proper placement of the beacon minimize the possibility of accidental activation. The simplest preventive measure is to ensure the VEP8A is correctly positioned.

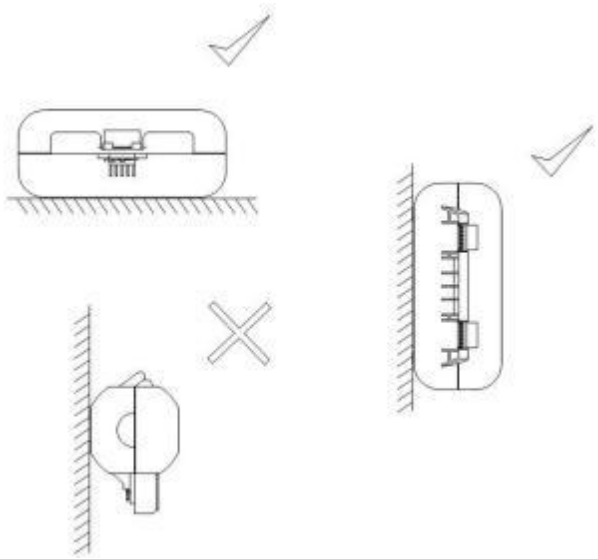
If the VEP8A causes a false alarm, take the following measures:

1. Notify the nearest search and rescue authority as soon as possible so they can suspend all rescue services promptly.
2. Turn off the VEP8A using the method described above (Section 4.5 Turning Off Transmission).
3. If the VEP8A cannot be turned off, unscrew the antenna, place the VEP8A in a sealed metal container and store it below deck for more than 20 days until the battery is depleted. Consult a service agent and return the faulty component.

5 INSTALLATION

The VEP8A is generally installed on both sides of the bridge or on the top of the bridge. The installation location should be as high as possible, easily accessible, easy to maintain, and convenient for manual activation; free from obstructions, exhaust fumes, chemical pollution, mechanical impact, and wave impact.

Warning: Avoid installation near strong magnetic fields and strong electric fields (e.g., high-power motors, radar, or communication antennas), as this may activate the EPIRB.

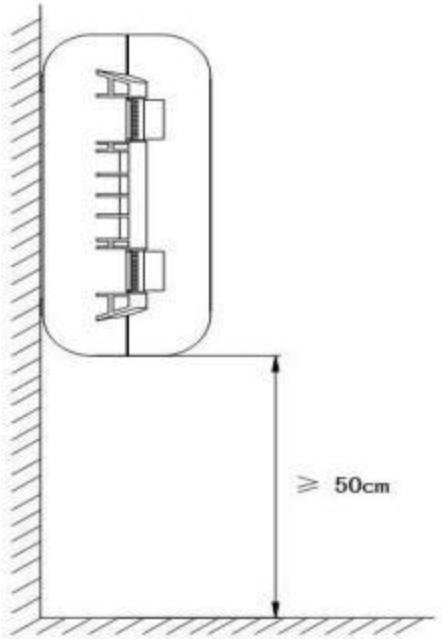


Installation Diagram

1. Open the release unit. Use the provided 4 fixing bolts to secure the rear cover of the release unit to an open location on the ship, ensuring the beacon can float to the surface unimpeded in an emergency (prevent obstruction by masts, antennas, or covers). Note that the bottom of the release unit should be at least 50cm from the ship's deck;

2. Gently bend the beacon's antenna at the lower end, and gently place the beacon along with the antenna into the rear cover of the release unit. Place the antenna into the pre-set antenna fixing hole. The label on the front of the beacon should be visible. Ensure the beacon is correctly positioned and snapped into place, avoiding left and right shaking and disengaging from the magnetic switch control;

3. Press the beacon gently by hand to ensure the spring plate inside the rear cover of the release unit functions. Check that the safety pin is intact because the VEP8A activates automatically in water. Then close the front cover of the release unit.



Installation Steps Diagram

During installation, also note to mark the expiry date on the yellow label of the Hydrostatic Release Unit (HRU) (cut it out with a knife or mark it with a pen) and fill in the label on the side of the VEP8A release unit. The HRU validity period is within two years from the installation date on the ship.

Retain the instructions from the original satellite EPIRB packaging, as they may be needed if the satellite EPIRB must be mailed for repair.

Certain batteries are classified as dangerous goods during transportation, and United Nations regulations require specific packaging standards and markings.

6 PRODUCT MAINTENANCE

6.1 Routine Inspection

Users should perform monthly inspections of the VEP8A on time. Inspection content should include:

1. Check for external damage and water ingress.

2. Check if the VEP8A is correctly placed on the bracket and does not shake side to side.

3. Check if the battery and Hydrostatic Release Unit (HRU) are within their validity periods. The battery validity period is 5 years, and the HRU validity period is 2 years.

6.2 Every 6 Months

Check the shelf life of the hydrostatic release system.

Check if the VEP8A can be easily removed from and placed into the release unit.

Perform a self-test. After the self-test is completed, reinstall the VEP8A into the release unit.

Warning:

To avoid transmitting a real 121.5MHz distress signal, self-testing should be limited to the first 5 minutes of any hour;

If the self-test indicator flashes after 10 seconds, it indicates a self-test abnormality, and the corresponding fault indicator light will illuminate. In this case, please contact the manufacturer or an authorized service network.

6.3 Annually

The annual inspection of the VEP8A should be conducted under the relevant government agencies.

6.4 Every Two Years

Extended inspections, including waterproofing and seal replacement, must be completed by an authorized service agent of the manufacturer.

The Hydrostatic Release Unit has a validity period of 2 years.

6.5 Every Five Years

All shore-based maintenance of VEP8A Satellite Emergency Position Indicating Radio Beacons must be performed by relevant departments according to the time specified in this manual, with intervals not exceeding 5 years. Testing must be conducted by organizations related to CIRCULAR/MSC/Circ. 1039.

The battery pack has a validity period of 5 years.

7 HYDROSTATIC RELEASE UNIT INSTALLATION

7.1 Main Performance Indicators

Release Depth	≤ 4 meters
Operating Environment	-30 to 65 °C
Storage Validity Period	2.5 years from the date of production
Service Validity Period	2 years

7.2 Installation Requirements

Before installation, confirm the product is within its storage validity period and install according to the following method.

- Place the pressure release mechanism into the pre-set fixing hole on the release unit. Secure it to the release unit using the 4 provided fixing screws

- Insert the dedicated safety pin into the trip lever lock hole at the bottom of the release mechanism and lock it securely

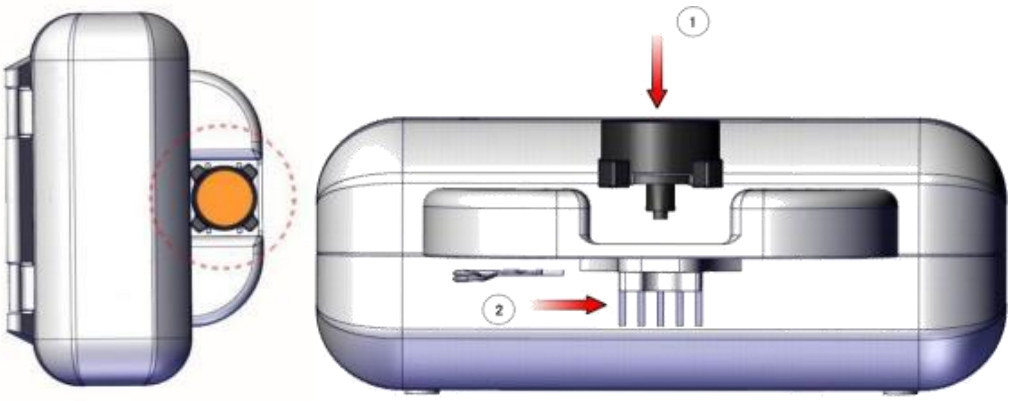


Figure 7: Hydrostatic Release Unit Installation

7.3 Validity Period Marking

When installing the Hydrostatic Release Unit, you must mark the product's service expiry date on the unit. After installation and use on board, the service validity period of the Hydrostatic Release Unit is 2 years. Calculate 2 years from the actual installation date and punch out the corresponding expiry date on the date label on the unit body. For example: Expiry date is August 2012, see Figure 9.

Figure 8: Hydrostatic Release Unit

8 BEACON BATTERY REPLACEMENT METHOD

Warning:

- Battery replacement must be performed by an authorized intermediary with relevant professional competence

- Do not open the VEP8A Satellite Emergency Position Indicating Radio Beacon privately, as it may affect the circuit and waterproof performance

- Do not charge or short-circuit the battery

- Dispose of old batteries through battery recycling agencies; do not discard them randomly

- Except for self-tests, the battery must be replaced after the satellite EPIRB operates for any purpose

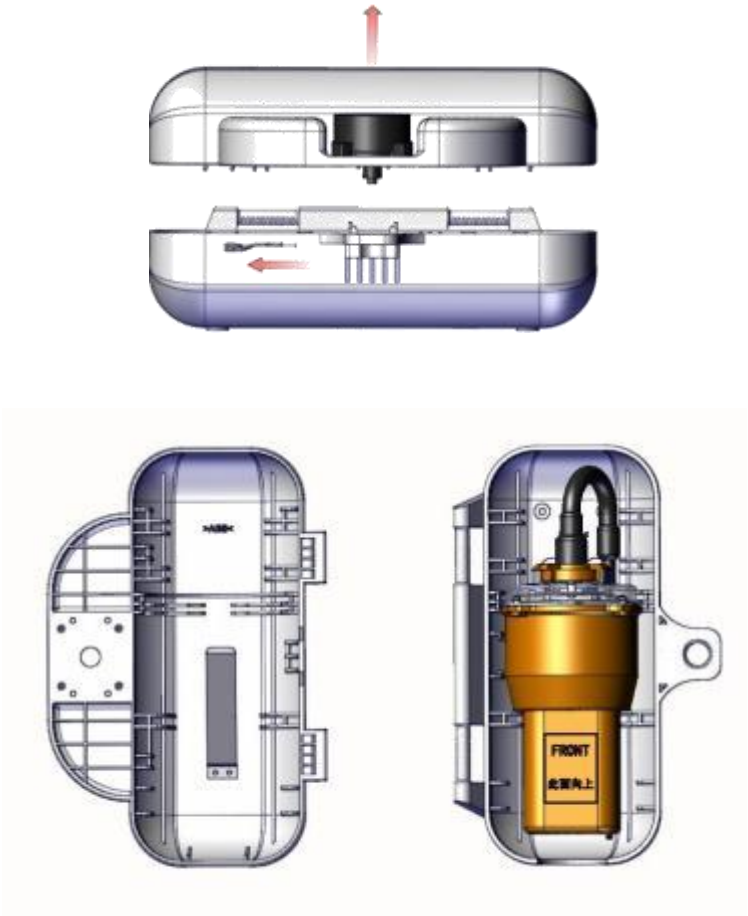
- Battery Type: Lithium Thionyl Chloride ($Li/SOCl_2$), 14.4V/14.5Ah, 4 ER34615M cells in series

- Gently pull out the safety pin from the trip lever lock hole at the bottom of the pressure release mechanism, open the release unit, and remove the beacon;
- Use appropriate tools to unscrew the fixing bolts at the four corners of the beacon, open the upper cover, and disconnect the connected power cable and water-sensitive switch cable. Handle gently to avoid breaking the wires;
- Unscrew the fixing screw on the battery, remove the old battery from the housing, replace it with a new battery, and tighten the screw (torque 0.5Nm). Pay attention to the battery plug orientation;
- Connect the power cable, place the sealing ring into the groove, place the upper cover back onto the housing, and tighten the four corner fixing bolts;

Note: Improper tightening may cause local cracking of the beacon. The correct method is: Screw in the 4 screws, and when resistance is felt, gradually tighten the screws in a diagonal order by about 270° (torque approximately 0.5Nm).

- Manually push the switch lever to the "TEST" position to perform a self-test. If the self-test result is normal, the self-test indicator will light steadily;

- Check watertightness: Invert the beacon and immerse it in hot water at about 60°C. No bubbles should emerge within 30 seconds. Remove the VEP8A from the water, dry it, and ensure the water-sensitive switch dries to turn off the VEP8A.
- After confirming watertightness is normal, securely place the beacon back into the release unit.



Battery Replacement Steps Diagram

9 DISTRESS SIGNAL CANCELLATION

If the VEP8A is activated by mistake, ensure the VEP8A continues to operate until every means is used to inform the local maritime search and rescue service center (SAR) that the alert is false.

Activation of the VEP8A generates a global COSPAS-SARSAT alert and simultaneously triggers rapid deployment and high-cost rescue efforts. When the VEP8A is falsely activated, notify the local SAR center that this alert is a false alarm and cancel the search and rescue operation before turning off the VEP8A and stopping transmission.

If a false activation of the VEP8A occurs, immediately request the Rescue Coordination Center (RCC) or the local maritime search and rescue center to cancel the false alarm in the form of a report. The report should be in English and include the satellite EPIRB's 15-Hex ID, date, time, duration, reason for activation, and location when deactivated. The content can refer to the following:

TOP URGENT TO: RCC

FM: MASTER OF M/V (SHIP NAME/SES ID)

DT: (DATE /TIME)

SUBJ: CANCELLED A FALSE DISTRESS ALERT

MY SHIP S-EPIRB GENERATED A FALSE DISTRESS ALERT IN POSN LAT ... . LON ... . AT ... .UTC, PLEASE CANCELLED, NOW MY SHIP CONDITION IS GOOD. THANK YOU.

12 BEACON DIMENSIONS

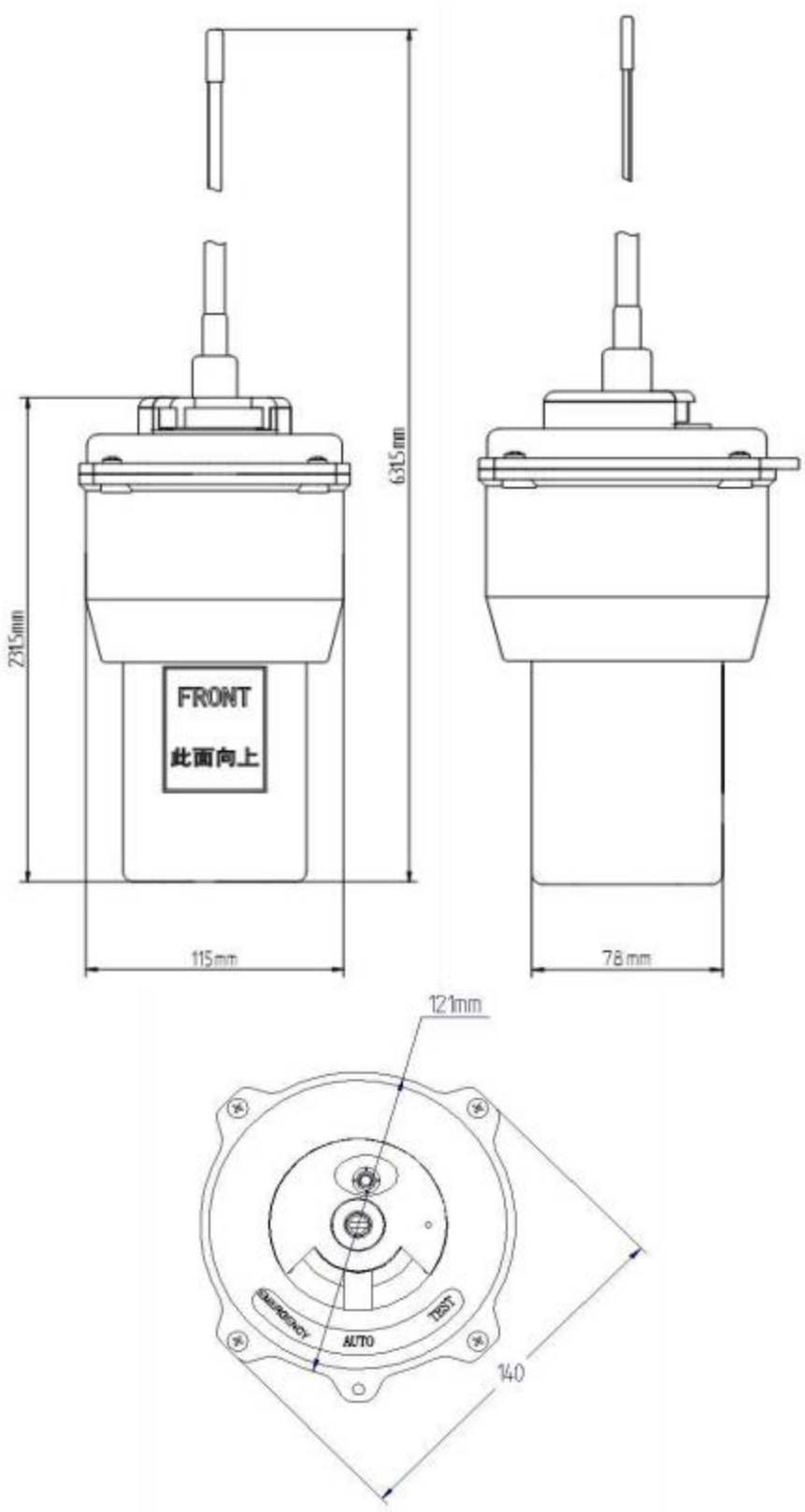


Figure 9: VEP8A Dimension Diagram

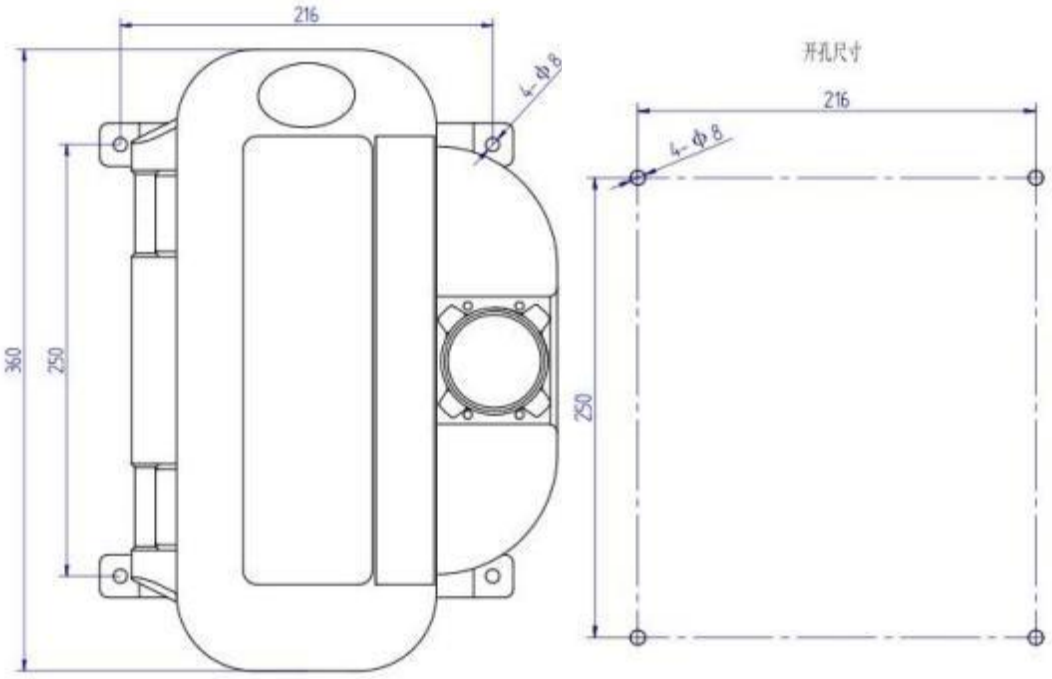


Figure 10: Release Unit Dimension Diagram (CCS)

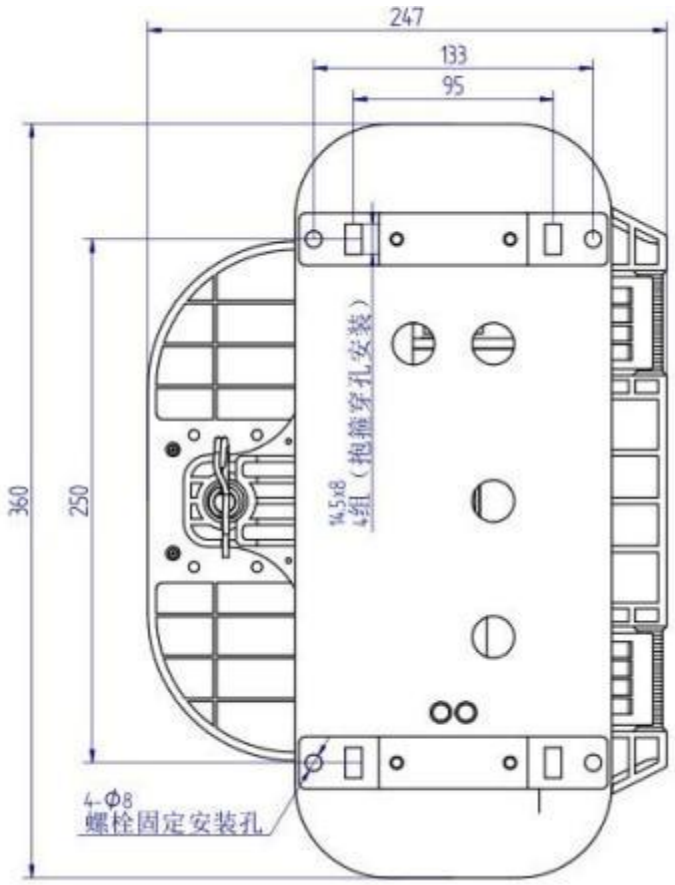


Figure 11: Release Unit Dimension Diagram (ZY)